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ABSTRACT

Science process skills considered important in making decisions and solving problems include: observing, classifying, measuring, using numbers, using space/time relationships, communicating, predicting, inferring, manipulating variables, making operational definitions, forming hypotheses, interpreting data, and experimenting. This 60-item test, developed for grade 6 but appropriate for grades 7 and 8, contains several items based on each of these processes. Test characteristics reported include a 5.5 readability level based on Dale-Chall readability formula and assumption of student familiarity with the metric system, content validity, and a split-half reliability coefficient of 0.294 using the Kuder-Richardson 20 formula. Suggested uses of the instrument include: (1) evaluating the level of competency or attainment of students on various processes; (2) evaluating the effectiveness of a particular teaching strategy in relation to process skill attainment; (3) evaluating the effectiveness of a science program or materials in the area of science processes; and (4) using the test as a model for designing an instrument better suited for a specific situation. A list of specific objectives and correct answers corresponding to each item is provided. (SK)

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ORES

Objective Referenced Evaluation in Science

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Developed by
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SE 037 698

PREFACE

One of the primary goals of public education in this country is to give future citizens the skills and knowledge they need in order to make decisions and solve problems throughout their life. The American Association for the Advancement of Science has identified several process skills which are considered important in making decisions and solving problems. These skills include observing, classifying, measuring, using numbers, using space and time relationships, communicating, predicting, inferring, manipulating variables, making operational definitions, forming hypothesis, interpreting data, and experimenting. Although many science programs stress these process skills, standardized tests do not address themselves to these processes. Except for relatively content specific tests available with some of the science programs, no process-oriented test appropriate for upper elementary grades has previously been available. This test contains several items based on each one of the process skills identified above (see the list of objectives for each test item).

The Objective Referenced Evaluation in Science (ORES) was developed for sixth grade students but could also be used for seventh and eighth grade students. Using the Dale-Chall readability formula and assuming student familiarity with the metric system (gram, meter, etc.), the estimated readability level is 5.5. The content validity was judged by a panel of experts. The test was piloted, revised, and administered to 147 sixth grade students in a research study conducted by the author. The split-half reliability coefficient using the Kuder-Richardson 20 formula was determined to be **0.924**.

Twenty-three items included in the test were taken from the SCORE (School Curriculum Objective Referenced Evaluation) Science item bank produced by the Riverside Publishing Company of Iowa City, Iowa. These items were copyrighted in 1975 but permission was granted to the author to use these items for research purposes. The table on the following page indicates the ORES Test Item Number and the Riverside Publishing Company Objective Number for the items taken from the SCORE test item bank.

Teachers, administrators, researchers, curriculum supervisors and curriculum evaluators should find this test helpful in situations such as the following:

(1) evaluating the level of competency or attainment of students on various processes
(2) evaluating the effectiveness of a particular teaching strategy in relation to process skill attainment
(3) evaluating the effectiveness of a science program or materials in the area of science processes
(4) using the test as a model for designing an instrument better suited for a specific situation

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ORES TEST ITEMS TAKEN FROM THE SCORE TEST ITEM BANK

ORES Test Item Number	Riverside Publishing Company Objective Number
6	75-30-150-01-0
8	67-35-330-01-1
9	67-35-330-02-2
10	75-50-220-01-0
11	77-10-320-01-0
12	79-40-150-01-0
14	81-10-180-01-0
16	67-25-160-01-0
18	75-60-340-01-0
20	77-10-130-01-0
21	65-25-240-01-0
25	65-15-120-01-0
29	79-50-570-01-0
31	65-50-250-01-0
32	67-30-240-01-0
35	79-30-130-01-0
37	65-15-110-01-0
40	79-50-390-01-1
41	79-50-390-02-2
42	79-50-390-03-3
47	79-50-280-01-0
48	79-50-280-02-2
60	75-65-250-01-0

Objectives and Answers for ORES

Item Number	Objective	Correct Answer
1	Identify one or more inferences which might be drawn from a given set of statistics and reports.	B
2	Estimate the area of a circle or an irregular figure which is gridded by counting "about how many" square centimeters are contained in the figure.	B
3	Identify a controlled variable in an experiment.	C
4	Identify the hypothesis which is being tested in an experiment.	D
5	Identify a valid inference based on evidence in a given selection.	D
6	Order a set of events in terms of the temporal order in which they happened.	B
7	Distinguish between statements of observation and statements of opinion.	B
8	Identify what property was used to divide a set of objects into groups, when objects differ in two values of one property.	B
9	Identify what property was used to divide a set of objects into groups when objects differ in two values of one property.	C
10	Predict whether two objects would travel at the same speed or whether one would go faster, given information about starting and ending points, times and distances traveled.	A
11	Identify additional observations needed to test an inference.	D
12	Identify a correct sequence of steps for testing a hypothesis	B
13	Predict the event which would logically occur next in a sequence.	B
14	Choose the type of graph which is most appropriate to represent a given set of data.	B
15	Make a logical prediction given data in a two-dimensional table.	B

Item Number	Objective	Correct Answer
16	Identify what property was used to divide a set of objects into groups, when objects differ in two values of one property.	D
17	Calculate and identify the average of a given set of data.	C
18	Use cardinal directions when identifying the route between given locations on a simple map.	D
19	Distinguish between statements of observation and statements of inference.	C
20	Identify an inference from observing a pictured situation.	A
21	Identify touching as an appropriate method of observation in a particular instance.	D
22	Identify a definition of the term variable.	D
23	Identify the decimal fraction which represents a given amount.	D
24	Identify a prediction which could be made on the basis of a particular set of observations.	B
25	Distinguish between statements of observation and inference in a paragraph.	A
26	Write or select a series of decimal fractions which is in correct ascending or descending order.	D
27	Make comparisons between parts of a bar graph.	D
28	Locate a specific piece of information on a two-dimensional table.	B
29	Identify human error as an uncontrolled variable in a given experiment.	D
30	Locate a specific piece of information in a bar graph.	D
31	Identify the sense or senses used for observation in a given story.	B

Item Number	Objective	Correct Answer
32	Identify how a set of objects can be divided into a specific number of groups when objects differ in size, with other properties varying.	A
33	Identify the standard metric units of of capacity measurement.	B
34	Read a distance scale on a map and identify the distance from one point to another.	C
35	Select a hypothesis from a group of statements.	B
36	Distinguish between the observations and predictions in a given example.	B
37	Distinguish between statements of observation and inference in a pictured situation.	C
38	Identify the best method of testing a hypothesis.	B
39	Identify an observation that supports a given hypothesis.	C
40	Identify variables which should be held constant in an experiment.	B
41	Identify the manipulated variables in an experiment.	D
42	Identify the responding variable in an experiment.	A
43	Solve a word problem using the addition of decimal fractions.	B
44	Identify the group into which a given object should be placed.	C
45	Select a measurement that is more precise than other measurements.	C
46	Recognize a term which needs to be operationally defined.	D
47	Identify variables which should be held constant in an experiment.	B
48	Identify the manipulated variable in an experiment.	C

Item Number	Objective	Correct Answer
49	Identify the hypothesis which is being tested in an experiment.	C
50	Identify data found on a line graph.	A
51	Make a logical prediction based on a line graph.	B
52	Identify variables which should be held constant in an experiment.	C
53	Identify the manipulated variable in an experiment.	D
54	Identify the responding variable in an experiment.	A
55	Identify data on a line graph that supports a hypothesis.	A
56	Recognize a term which needs to be operationally defined.	D
57	Make a logical prediction based on data from a bar graph.	C
58	Identify an object or term by using an operational definition and interpreting data from a bar graph.	B
59	Identify an object or term by using an operational definition and interpreting data from a bar graph.	A
60	Locate several points, given the rectangular coordinates.	B

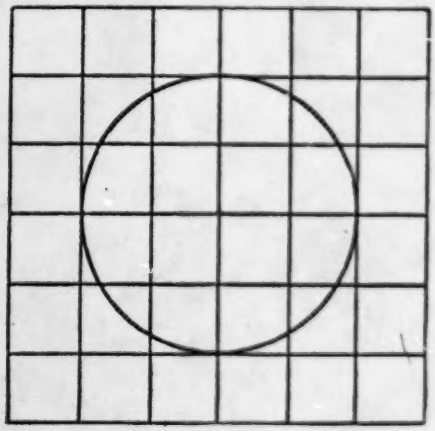
1. Below is a table showing the temperature at different times during a day in Burlington.

TIME	DEGREES CENTIGRADE
4 a.m.	12° C
6 a.m.	11° C
8 a.m.	14° C
10 a.m.	18° C
12 noon	23° C
2 p.m.	15° C
4 p.m.	17° C
6 p.m.	15° C
8 p.m.	12° C

Which statement below is the best inference about the weather?

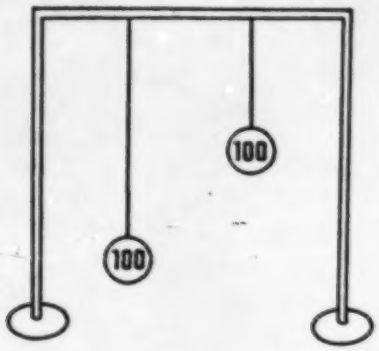
(A) The temperature rose all morning long.
(B) A cold front reached Burlington between 12 and 2 p.m.
(C) It is summer in Burlington.
(D) It is the coldest day of the year.

2. In the grid below, each square is one square centimeter. The circle has an area of about _____ square centimeters.



(A) 8
(B) 13
(C) 16
(D) 36

3. Fred did an experiment to find out if the length affects the amount of time it takes a pendulum to swing back and forth. He took 2 strings and tied them onto a bar. One string was 20 centimeters long and the other string was 40 centimeters long. On both strings he tied a 100 gram weight. His experiment looked like this:



Then he wrote down the number of times each pendulum swung back and forth in 60 seconds.

What variable did Fred control in his experiment ?

(A) the length of the strings
(B) the time it took the pendulums to swing back and forth
(C) the weight on the end of the strings
(D) the speed of the pendulums

4. The hypothesis Fred was testing in the above experiment was

(A) the amount of weight will affect how fast the pendulum will swing.
(B) the 20 centimeter pendulum will swing faster than the 40 centimeter pendulum.
(C) the 40 centimeter pendulum will swing faster than the 20 centimeter pendulum.
(D) the length of the string will affect how fast the pendulum will swing.

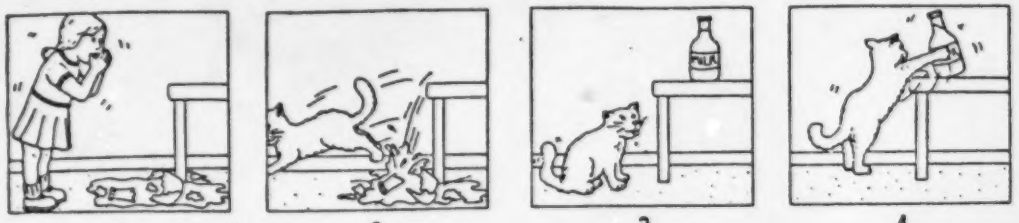
5. England and France have built a very fast, very noisy airplane called the Concorde. Some people are worried that the Concorde might destroy ozone in the atmosphere. If this happened, more people would get skin cancer.

Doctor Wilson is a scientist who is a member of a group named Save Our Environment. What would Dr. Wilson probably think about letting the Concorde land in the United States?

(A) It should land because France and England spent a lot of money to build the plane.
(B) It should land because people in this country need to get to other places quickly.
(C) It should not land because it costs too much to buy a ticket for the Concorde.
(D) It should not land because the noise and destruction of the ozone would harm the environment.

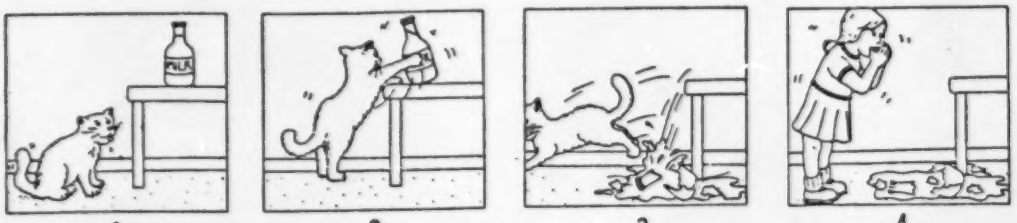
6. Below are four sets of pictures. One set of pictures shows what happened first, second, third, and fourth in the right order. Which set of pictures is in the right order from first to last?

(A)



1 2 3 4

(B)

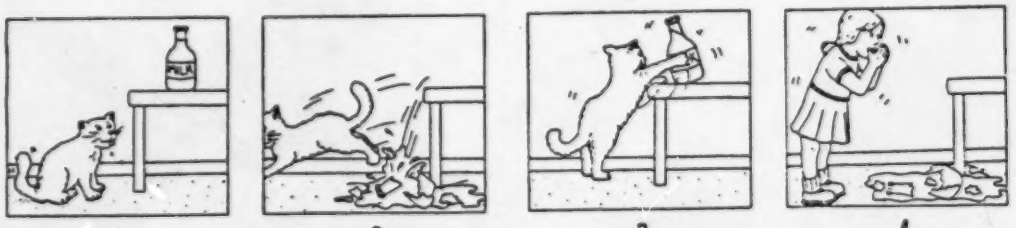


1 2 3 4

(C)

1 2 3 4

(D)



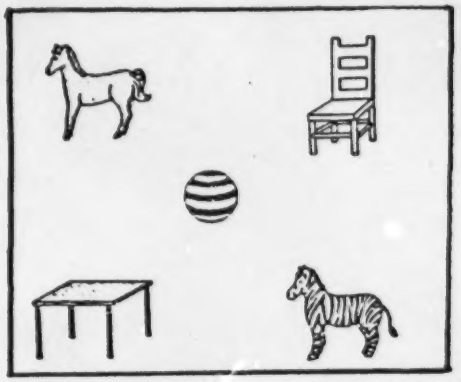
1 2 3 4

7. Some students were given a glass of buttermilk and were asked to observe and describe it. Which student stated an OPINION rather than an observation.

(A) "It is a white liquid."
(B) "It tastes terrible."
(C) "It feels and looks wet."
(D) "It feels cold."

8. Martin had a group of pictures that he wanted to divide into two sets. He looked at the pictures and saw that there was more than one way that they could be divided. Here is the first way that he grouped the pictures into two sets.

SET 1

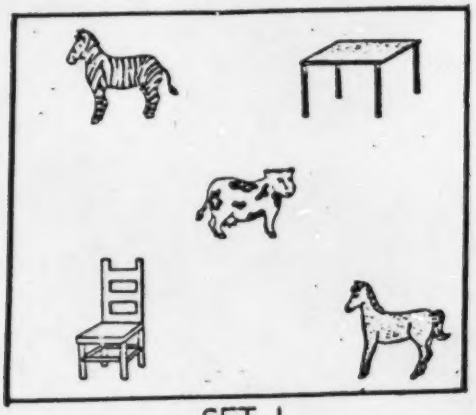


SET 2

How did he arrange the pictures into these two sets?

(A) Set 1 has living things, and Set 2 has non-living things.
(B) Set 1 has spotted things, and Set 2 has things without spots.
(C) Set 1 has moving things, and Set 2 has non-moving things.
(D) Set 1 has things with two colors, and Set 2 has things with one color.

9. Then Martin grouped the same pictures into two different sets.



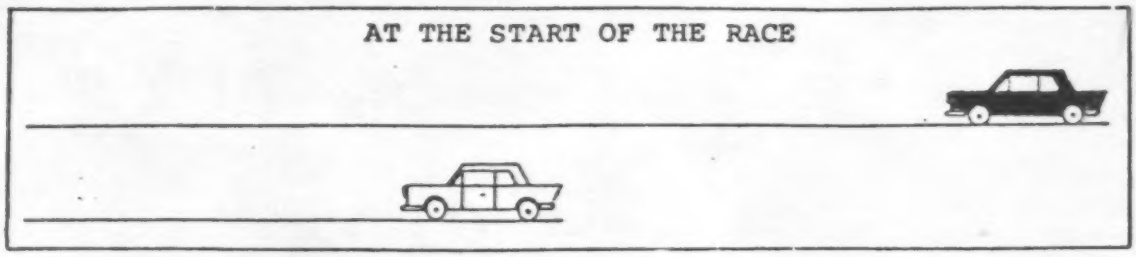
SET 1

SET 2

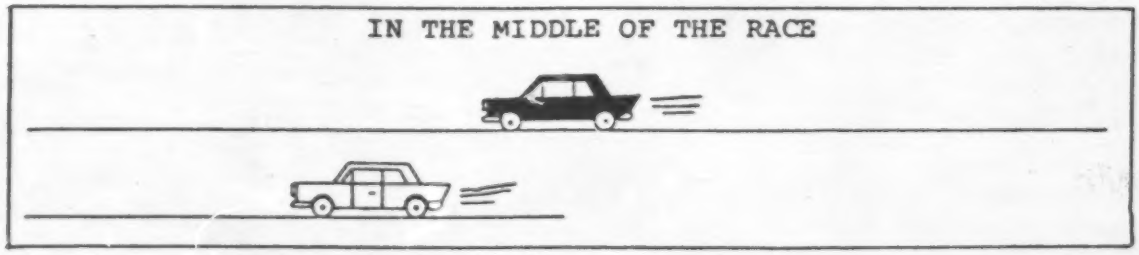
How did he arrange the pictures into the two sets above?

(A) Set 1 has things that are made by people, and Set 2 has things that are not made by people.
(B) Set 1 has moving things, and Set 2 has non-moving things.
(C) Set 1 has things with 4 legs, and Set 2 has things that do not have 4 legs.
(D) Set 1 has animals, and Set 2 does not have animals.

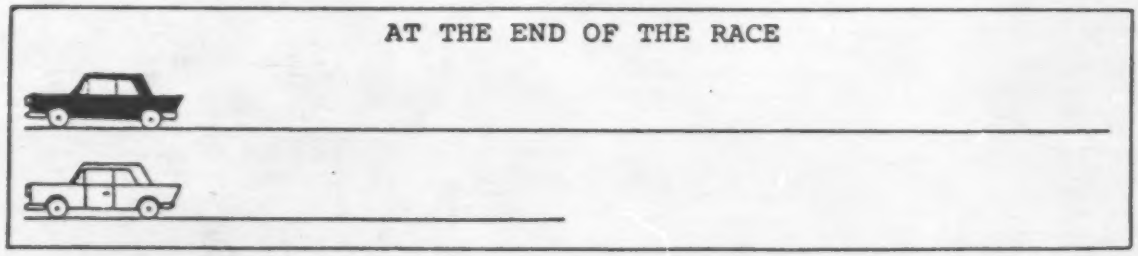
10. It was the day of the big Auto Race. The black car and the white car lined up on the race tracks. The race track for the black car was twice as long as the race track for the white car. The two cars began the race at exactly the same time. Here is how the two cars looked at the start of the race.



Here is how the two cars looked in the middle of the race when exactly half of the time had gone by.



Here is how the two cars looked at the end of the race. They reached the finish line at exactly the same time.



What can be said about the speeds of the black car and the white car during the race?

(A) The black car traveled at a faster speed than the white car.
(B) The white car traveled at a faster speed than the black car.
(C) The black car and the white car both traveled at the same speed.
(D) You cannot compare the speeds of the black car and the white car.

11. One day Janet noticed that her goldfish was swimming around near the top of the tank while she was playing the record player. She inferred that sounds made the fish swim near the top of the water.

Janet did some things and made some observations. Which one of Janet's observations was MOST helpful in testing her inference?

(A) The fish stayed on the bottom when she left the record player turned off and tried to be quiet.

(B) The fish came up to the top when she sprinkled some food on the water.

(C) The fish stayed on the bottom when she put her finger in the water.

(D) The fish came up to the top when she rang a bell and went down when she stopped ringing it.

12. Which list below gives the correct order of steps for testing an hypothesis?

(A) 1. perform the test and write down the data
2. identify the variables and design the test
3. decide if the data show that the hypothesis could be true or is false
4. think about the meaning of the data and draw conclusions

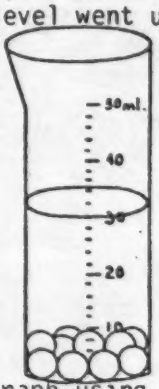
(B) 1. identify the variables and design a test
2. perform the test and write down the data
3. think about the meaning of the data and draw conclusions
4. decide if the data show that the hypothesis could be true or is false

(C) 1. decide if the data show that the hypothesis could be true or false
2. think about the meaning of the data and draw conclusions
3. identify the variables and design a test
4. perform the test and write down the data

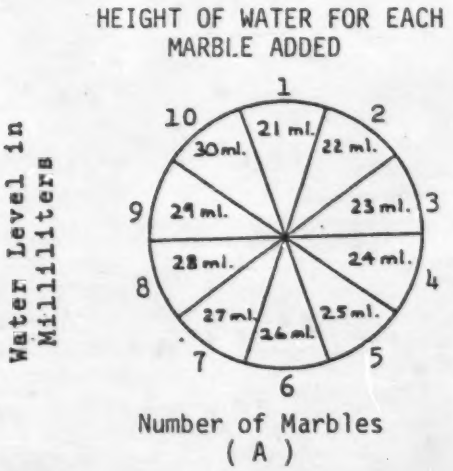
13. Janice lived near the ocean. She wanted to know if the tide was highest at the same time every day. She decided to keep a record of the time that it was highest each day for a week. On Monday, it was highest at 3:20 in the afternoon. On Tuesday it was highest at 4:23 p.m. and on Wednesday it was highest at 5:27 p.m. What time will the tide probably be the highest on Thursday.

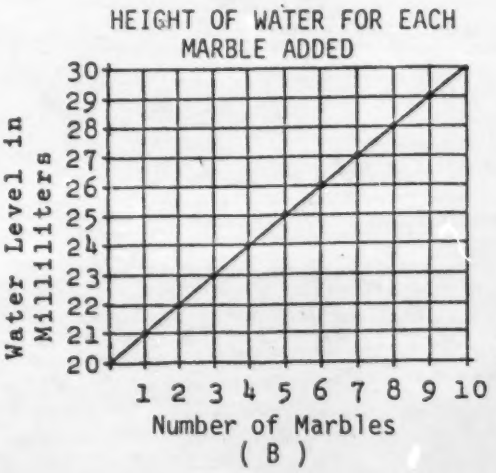
(A) 5:03 p.m.
(B) 6:30 p.m.
(C) 7:17 p.m.
(D) 10:58 p.m.

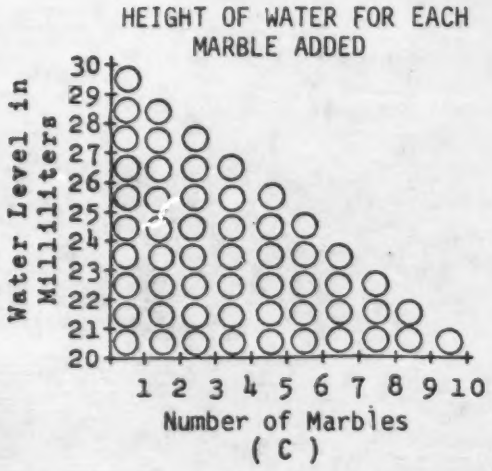
14. Bonnie did an experiment with volume. She took a graduated cylinder and put 20 milliliters of water in it. Then she dropped a marble into the water and wrote down how much the water level went up. She kept adding marbles until there were 10 marbles in the water. Each time she wrote down how much the water level went up. Here is how the cylinder looked.

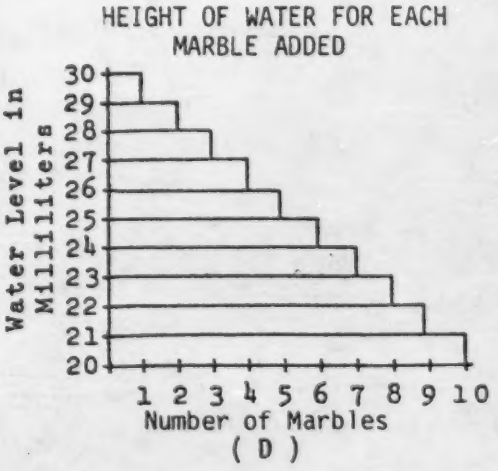


Bonnie wanted to make a graph using her data. Which type of graph would be BEST to show the results of this type of experiment.









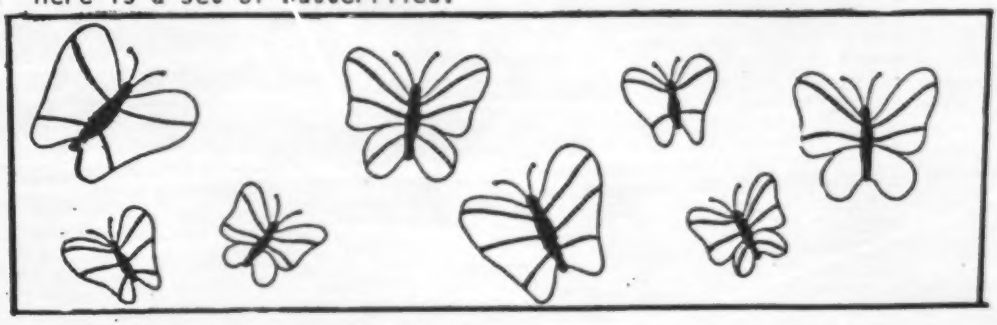
15. Tom filled three plastic bags of sand. The plastic bags were all the same size and shape but one was white, one was black and one was clear. He then set the three bags outside in bright sunshine. Tom measured the temperature of the sand every ten minutes.

TIME	Temperature in clear bag	Temperature in black bag	Temperature in white bag
0 minutes	20 degrees C.	20 degrees C.	20 degrees C.
10 minutes	22 degrees C.	23 degrees C.	21 degrees C.
20 minutes	24 degrees C.	26 degrees C.	22 degrees C.
30 minutes	26 degrees C.	29 degrees C.	23 degrees C.

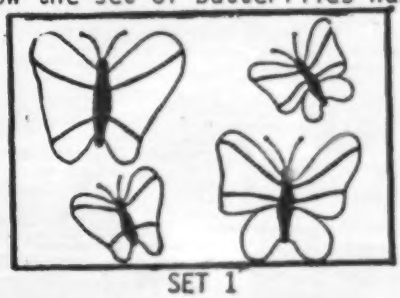
What would the results probably be if he took another reading at 40 minutes?

(A) The sand in the white bag would be hotter than the sand in the other bags.
(B) The sand in the black bag would be hotter than the sand in tne other bags.
(C) The sand in the clear bag would be hotter than the sand in the other bags.
(D) The sand in all three bags would be the same temperature.

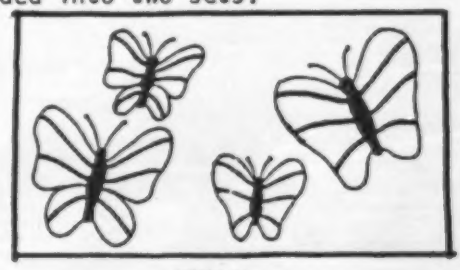
16. Here is a set of butterflies.



Now the set of butterflies has been divided into two sets.



SET 1



SET 2

How were the butterflies divided into Sets 1 and 2?

(A) by the number of wings
(B) by size
(C) by shape
(D) by the number of stripes

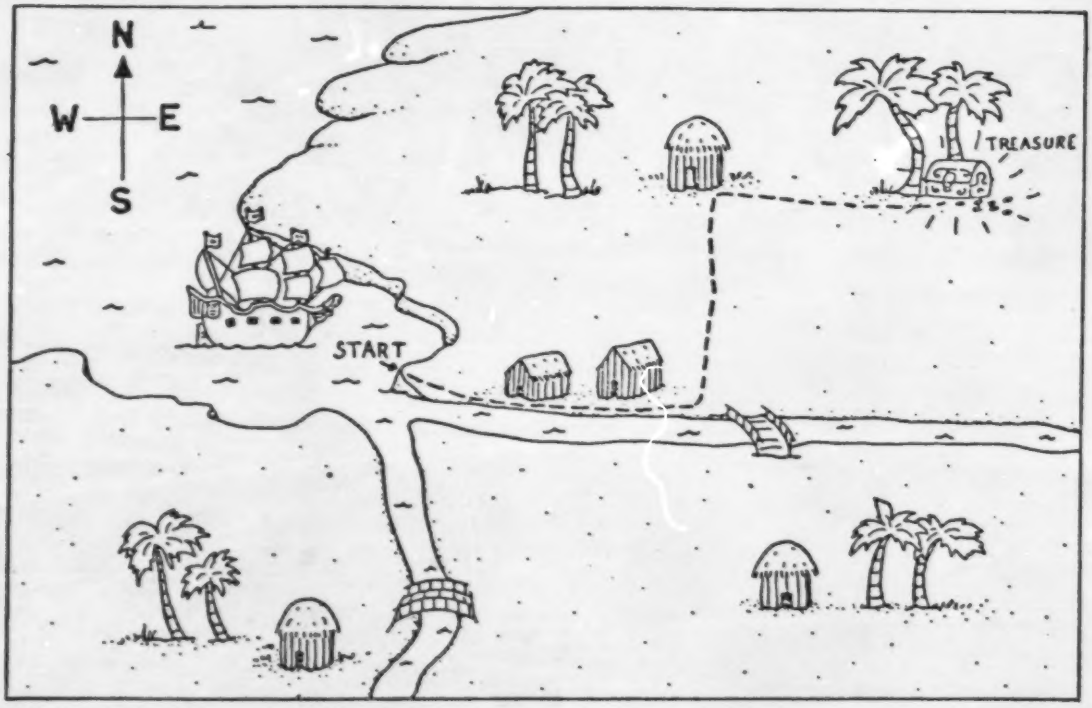
17. Janice, Fred, and Susan each ran one time around a track. A friend kept a record of the number of seconds that each one took to run the race. Here are their times:

Janice - 49 seconds Fred - 45 seconds Susan - 44 seconds

What was the average time for the 3 runners?

(A) 44 seconds
(B) 45 seconds
(C) 46 seconds
(D) 138 seconds

18.



Which one of the following is the correct set of directions for reaching the treasure if you start from the ship?

(A) Follow the river east until you reach the bridge. Go south to the grass hut. Turn west and go to the 2 large trees.

(B) Follow the river south until you reach the bridge. Go north to the grass hut. Turn west and go to the 2 large trees.

(C) Follow the river south until you reach the bridge. Go south to the grass hut. Turn east and go to the 2 large trees.

(D) Follow the river east until you reach the bridge. Go north to the grass hut. Turn east and go to the 2 large trees.

19. Some students were describing a candle they had found in a box.

Which one of their statements is an inference, instead of an observation?

(A) "The candle is yellow."
(B) "The wick is black."
(C) "The candle has been burned."
(D) "The candle is 14 centimeters tall."

20. **Observe this classroom scene.**

Which statement about the scene is an inference?

(A) One of the girls is asleep.
(B) One of the boys is painting.
(C) One of the girls is sitting on the floor.
(D) One of the girls is watering a plant.

21. What is the BEST way to find out if a wooden block is smooth?

(A) Scrape it against a table and listen to the sound it makes.
(B) Hold it up to see how much light it reflects.
(C) Push it across the floor to see how far it will slide.
(D) Rub it with your hands to feel any rough places.

22. A variable in an experiment is

(A) the way the equipment is set up.
(B) a method that is used.
(C) the results of the experiment.
(D) any factor that can change.

23. Choose the number below that is equal to three tenths.

(A) .030
(B) .003
(C) .03
(D) .3

24. Chris was experimenting with a rubber ball in science class. He wanted to see how high the ball would bounce when it was dropped from different heights.

Chris dropped the ball from a height of 2 feet and it bounced back 1 foot. Then he dropped it from 4 feet and it bounced back 2 feet.

He dropped the ball one more time. He stood on a ladder and dropped it from a height of 6 feet. How high did the ball bounce when he dropped it from 6 feet?

(A) lower than when he dropped it from 4 feet
(B) higher than when he dropped it from 4 feet
(C) the same height as when he dropped it from 4 feet

25. Read the paragraph below and then answer the question that follows.

Burt and Grace Noles were building a tree house in their back yard. They were using a rope to lift up the boards that they needed. Suddenly the rope broke and the boards fell to the ground. "Wow!" shouted Grace. "The rope just broke. That stack of lumber must have been too heavy." "I don't think so, " Burt argued. "Maybe the rope wasn't strong enough. It was getting too old and rotten to lift the boards."

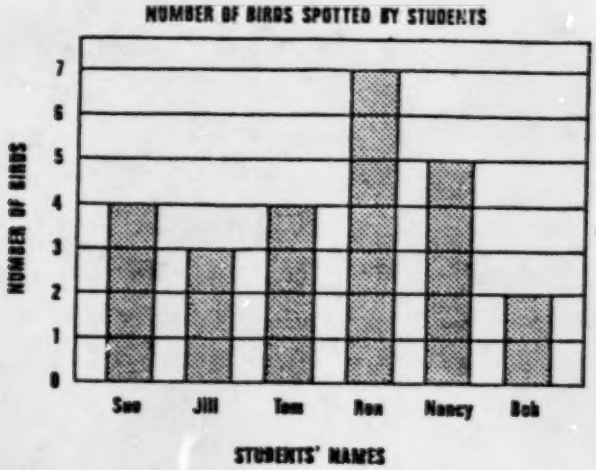
Which one of their statements is an observation?

(A) "The rope just broke."
(B) "That stack of lumber must have been too heavy."
(C) "Maybe the rope wasn't strong enough."
(D) "It was getting too old and rotten to lift the boards."

26. Which list of numbers is in order from smallest to largest?

(A)	.6	.36	.48
(B)	.28	.057	.376
(C)	.07	.38	.082
(D)	.027	.11	.6

27. A group of students went bird watching. Each student counted the number of birds they saw in a certain place. They put all of their data together to make a bar graph.



Who saw more birds than Tom?

(A) Sue
(B) Jill
(C) Bob
(D) Nancy

28. Jim kept a record of the different animals he saw in the field behind his house. Every week he counted each kind of animal and wrote the number in a table. Look at Jim's table.

NUMBER OF ANIMALS EACH WEEK

KIND OF ANIMAL	Week 1	Week 2	Week 3	Week 4
rabbits	12	10	6	10
snakes	2	3	4	3
deer	2	2	1	3
mice	6	4	4	5

How many rabbits did Jim see during the third week?

(A) 4
(B) 6
(D) 10
(E) 1

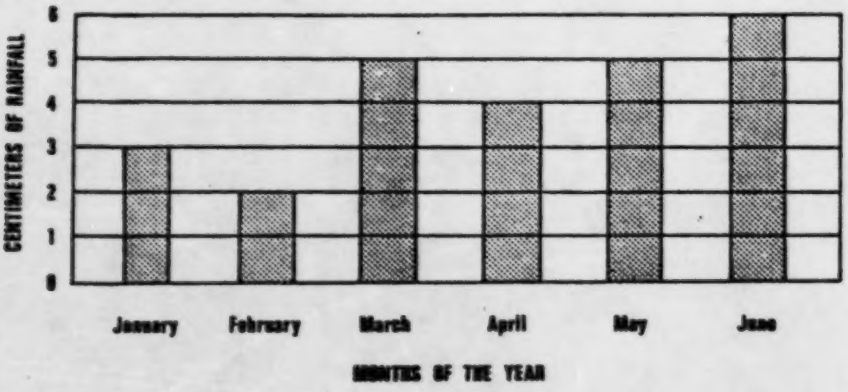
29. Some students who had pet frogs did an experiment to see whose frog was the best jumper. They drew a straight line on the floor and put all of the frogs on the line. This is how the race track looked.

The students all held their frogs down until somebody said, "Go." Then each student released his or her frog and gave it a push to get it started. The first frog over the finish line was supposed to be the winner.

When the race was over, the students began to argue about which frog was really the best jumper. They had forgotten to control an important variable, and something was different for each frog in the race. What variable was not controlled?

(A) the way the frogs were lined up at the start
(B) the time of day that the race was held
(C) the distance each frog had to jump to the finish line
(D) the way the frogs were released and pushed

30. The weather station printed the following graph showing the average rainfall for the first 6 months of the year.



How many centimeters of rain fell in the month of May?

(A) 1 centimeter
(B) 3 centimeters
(C) 4 centimeters
(D) 5 centimeters

31. Read this story and then answer the question that follows.

Mick was tucked under the covers of his bed, sleepily watching the TV set. All of his friends were in school by now. But Mick had the mumps.

He thought that he might be sick when he drank his milk last night. Every time he swallowed, his ears and throat hurt. This morning he felt his neck and decided that it was swollen. He put a thermometer under his tongue. A few minutes later the thermometer read 101 degrees. When he looked in the mirror, he knew he had the mumps.

Which of his five senses helped Mick observe that he was sick?

(A) hearing and taste
(B) touch and sight
(C) sight and hearing
(D) touch and taste

32. Look at this set of hats.

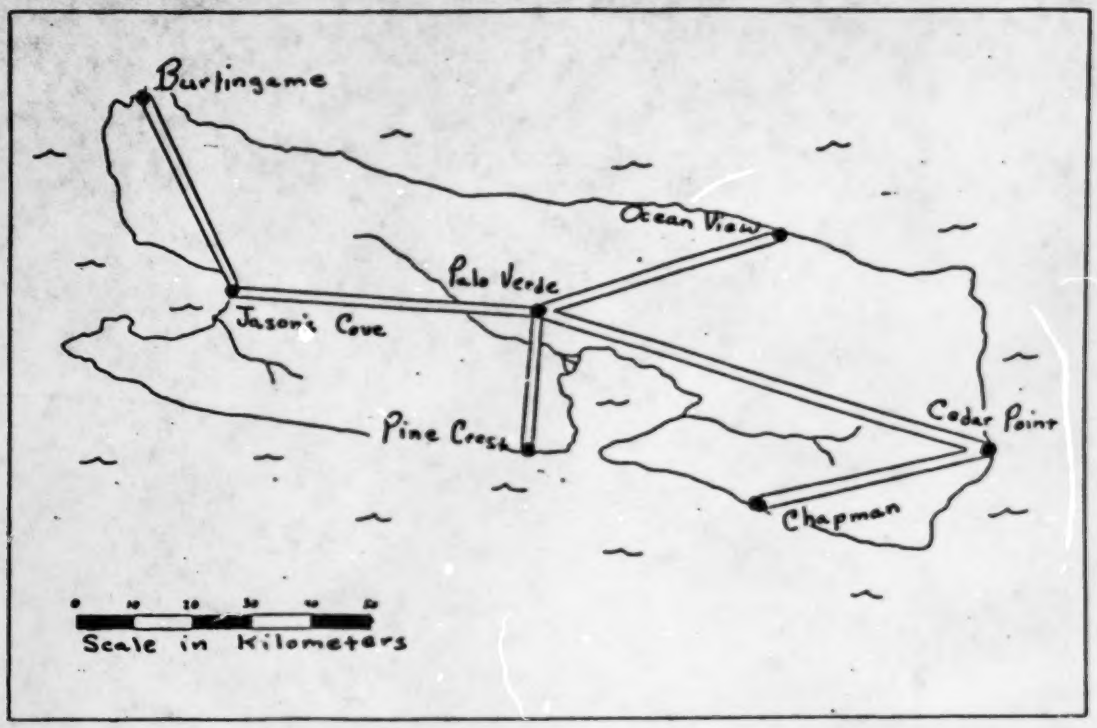
How could you divide this set of hats into THREE groups so that all the hats in a group are alike in some way? Each group of hats would be different from the other groups.

(A) 3 different sizes of hats
(B) 3 different shapes of hats
(C) 3 different colors of hats
(D) 3 different kinds of hats

33. What units should you use if you want to measure the volume of gasoline a gas tank can hold?

(A) square meters
(B) liters
(C) centimeter
(D) grams

34



On the map above, how far is it from Jason's Cove to Ocean View?

(A) 40 kilometers
(B) 50 kilometers
(C) 90 kilometers
(D) 150 kilometers

35. One day in science class, Paula found some seeds sprouting in a dark cupboard. She thought darkness might help seeds to sprout faster, and decided to experiment to find out.

Paula wrapped some peas in a wet paper towel and put them in a dark drawer. She wrapped some more peas in a wet paper towel and put them on a sunny windowsill.

After three days, Paula looked at the peas. The peas from the dark drawer had more sprouts than the ones from the windowsill. Paula decided that peas sprout faster in the dark than in the light.

Which sentence from the story tells Paula's hypothesis?

(A) Paula found some seeds sprouting in a dark cupboard.
(B) She thought darkness might help seeds to sprout faster.
(C) The peas from the dark drawer had more sprouts.
(D) Paula decided that peas sprout faster in the dark.

36. Some students were discussing the weather in science class one day. Which one of their statements was a prediction rather than an observation?

(A) "It certainly is cloudy today."
(B) "When it starts to cool off tonight it could rain."
(C) "The temperature is 82 degrees Fahrenheit."
(D) "The barometric pressure is lower today than it was yesterday."

37.

Which one of the following is an observation about the picture above?

(A) The bird is afraid of the cat.
(B) The cat wants to climb the tree and catch the bird.
(C) The bird is sitting on a branch above the cat.
(D) The cat is hungry.

38. Robin and Jill were watching several ants carrying small seeds back to the ant den. All the ants seemed to follow the same tiny path. The girls wondered how the ants found their way to the food and then back to the den. They put a small piece of paper on top of the ant's path. When the ants reached the piece of paper, they seemed confused and began to go in different directions. The girls made a hypothesis that maybe ants feel their way with their feelers. Maybe when the ants came to the paper, it did not feel right, so the ants were confused. The girls decided to make more observations to test their hypothesis.

Which of the following observations would be most helpful in testing the hypothesis?

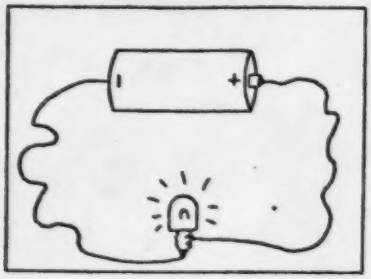
(A) Put sandpaper over the path and see if it confuses the ants.
(B) Remove their feelers and see if the ants can find their way along the path.
(C) Put sugar at one end of the path to see if the ants travel faster.
(D) Put grass and leaves over the path and see if the ants can find their way.

39. Which of the following observations would support Robin and Jill's hypothesis?

(A) Putting a dirt over the path also confused the ants.
(B) After a short time, the ants found their way across paper, sandpaper, leaves and other objects which the girls put across the path.
(C) The ants seemed to be touching the ground with their feelers as they went along the path.
(D) After getting the path hot by shining a heat lamp on it, the ants could still find their way.

Read about this experiment and then answer the following THREE questions:

Dora thought that a flashlight bulb would shine more brightly if it had more batteries for power. She took a bulb and attached 1 battery to it. She used a dark room and observed the amount of light that the bulb gave off. Her experiment looked like this:



40. Then she took the same bulb and attached 2 batteries to it. The bulb burned much more brightly. When she attached 3 batteries to the bulb, it was brighter than it had been with 2 batteries.

In the experiment above, what was the controlled variable?

(A) the brightness of the light from the bulb
(B) the flashlight bulb that was used
(C) the length of time that the bulb burned
(D) the number of batteries attached to the bulb

41. In Dora's experiment, what was the manipulated variable?

(A) the brightness of the light from the bulb
(B) the flashlight bulb that was used
(C) the length of time that the bulb burned
(D) the number of batteries attached to the bulb

42. In Dora's experiment, what was the responding variable?

(A) the brightness of the light from the bulb
(B) the flashlight bulb that was used
(C) the length of time that the bulb burned
(D) the number of batteries attached to the bulb

43. Mary needed to buy two pieces of wire for an experiment. One piece needed to be .7 meters long, and the other piece needed to be 1.6 meters long. How much wire should she buy altogether?

(A) 8.6 meters
(B) 2.3 meters
(C) 1.67 meters
(D) 1.3 meters

44. Terry had divided the leaves in his leaf collection into two groups

Group A Group B

Which one of the following leaves should fit into Group B?

(A) (B) (C) (D)

45. Four students measured different things about an ice cube in science class. Which student made the most precise measurement?

(A) Don: "It is colder than 40°F."
(B) Susan: "It is about 1 cubic inch in size."
(C) Bob: "It weighs 39 grams."
(D) Denise: "It melted in less than 1/2 hour.

46. A medical doctor made the statement, "Girls are usually biologically stronger than boys."

Before you can agree or disagree with this statement you will need to know

(A) if the doctor is a man or a woman
(B) whether the girls the doctor tested were larger than the boys
(C) whether girls are sick as much as boys
(D) what the doctor meant by "biologically stronger".

GO ON TO NEXT PAGE.

Read the story about the experiment and then answer the TWO questions that follow.

Jenny did an experiment to find out how fast liquids will drip out of a bottle. She filled a plastic bottle with water and poked a hole in the bottom of the bottle with a nail. Then she counted the number of minutes it took for all of the water to drip out of the bottle. Next Jenny filled the bottle with syrup. Again she counted the minutes it took for the syrup to drip out of the bottle. Then she rinsed all the syrup out of the bottle and filled it with oil. She counted the number of minutes it took the oil to drop out. When she had finished she made this chart to show her results.

Type of Liquid	Minutes to Drip
Water	10 min.
Syrup	21 min.
Oil	16 min.

47. Which variables were kept the same in Jenny's experiment?

(A) the type of liquid and the type of bottle
(B) the amount of liquid in the bottle and the type of bottle
(C) the type of liquid and the time it took the liquid to drip out
(D) the amount of liquid in the bottle and the time it took the liquid to drip out

48. What variable did Jenny change in her experiment?

(A) the amount of liquid in the bottle
(B) the type of bottle
(C) the type of liquid in the bottle
(D) the way she timed the dripping

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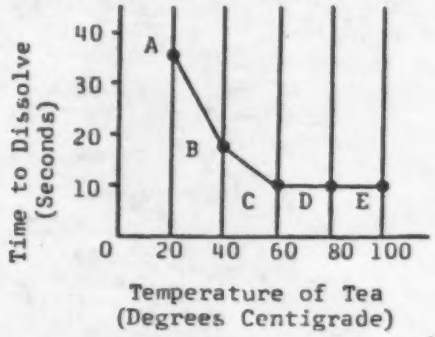
Read the following story and answer the next seven questions.

Sue could not get two teaspoons of sugar to dissolve in her iced tea unless she stirred for a long time. She knew she could easily dissolve the sugar in hot tea. Sue wondered if the temperature made a difference in the amount of time it took for the sugar to dissolve. After trying five different temperatures Sue got the results shown on the graph.



49. The hypothesis Sue was testing was probably

(A) The colder the tea, the quicker the sugar will dissolve.
(B) The sugar will dissolve at the same rate in 60° tea as it does in 100° tea.
(C) The hotter the tea the quicker the sugar will dissolve.
(D) The temperature of the tea does not affect how rapidly the sugar dissolves.

50. The sugar dissolved slowest when the temperature was

(A) 20°
(B) 40°
(C) 60°
(D) 100°

51. If Sue had lowered the temperature to 10°, the sugar would probably have dissolved in

(A) less time than 40°
(B) more time than 20°
(C) the same amount of time as 20°
(D) None of the sugar would have dissolved since it was getting close to freezing (0°)

52. While doing the experiment it would probably be best if Sue would

(A) use iced tea glasses for low temperatures and a tea cup for high temperatures
(B) stir the tea at the low temperatures to help the sugar dissolve faster
(C) use the same amount of tea each time
(D) use tea bags to make the hot tea and use instant tea for the lower temperatures

53. In the experiment Sue would probably be changing

(A) the amount of sugar used at each temperature
(B) the amount of tea used at each temperature
(C) the amount of time it takes for the sugar to dissolve
(D) the temperature of the tea

54. The results Sue was interested in were

(A) the temperature of the tea
(B) the amount of sugar that would dissolve in 40 seconds
(C) how sweet the tea tasted after the sugar dissolved
(D) the amount of time it took for the sugar to dissolve

55. Which part of the graph supports Sue's hypothesis

(A) $\overline{AB}$

(B) $\overline{CD}$

(C) $\overline{DE}$

(D) the whole graph supports the hypothesis

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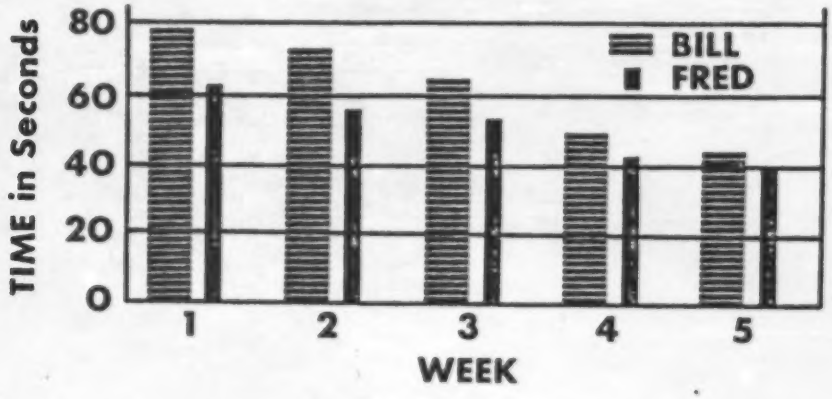
Read the following story and answer the next four questions.

Bill and Fred were both going out for track. They kept a record of the time it took them to run once around the track. As the season passed their time improved. Use the bar graph of their times to answer the following questions.



56. Before we can tell which is the best athlete we will need to know

(A) which boy spent the most time working out.
(B) what their times were at the end of eight weeks.
(C) which boy followed the coach's training rules the best.
(D) what is meant by the term "best athlete."

57. The best prediction of Bill's time during the sixth week would be

(A) 50 seconds
(B) 45 seconds
(C) 35 seconds
(D) 25 seconds

58. If the best athlete is the boy who runs once around the track in the shortest time at the end of five weeks, which boy is best?

(A) Bill
(B) Fred
(C) Impossible to tell

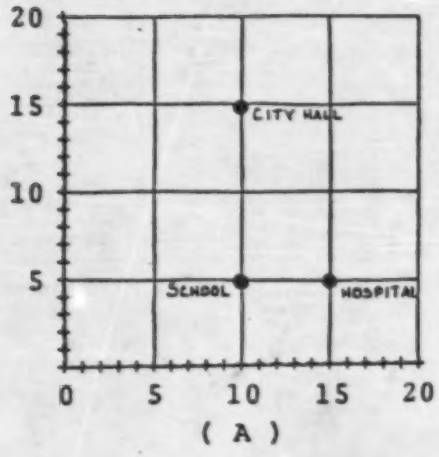
59. If the best athlete is the boy who makes the most improvement, which boy is best?

(A) Bill
(B) Fred
(C) Impossible to tell

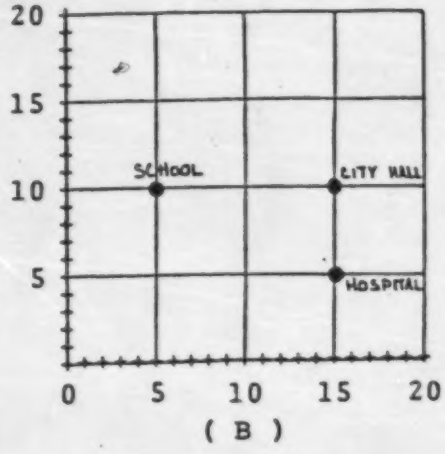
60. Here are the numbers that give the locations for 3 buildings on a grid. These numbers are called rectangular coordinates.

City Hall - (15, 10)
Hospital - (15, 5)
School - (5, 10)

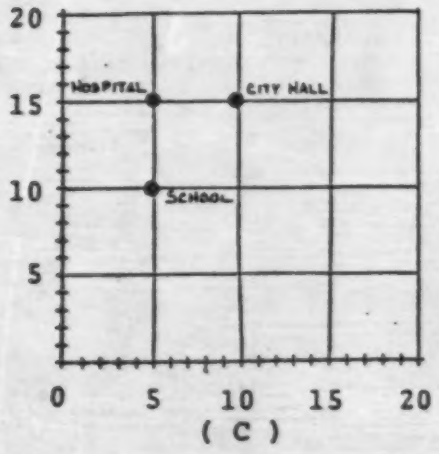
Which grid below shows the correct location for all 3 of these buildings?



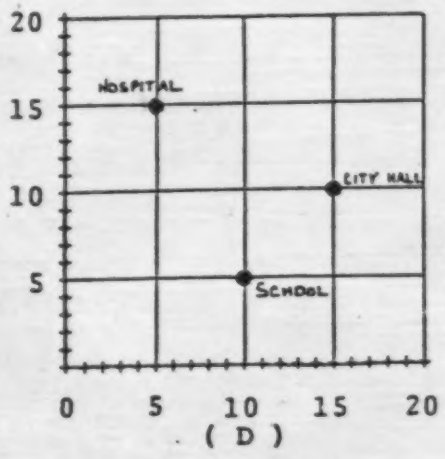
(A)



(B)



(C)



(D)